

an optical detector for receiving said reflected point source image and for  
converting said point source image to corresponding digital signals;

a digital data processor for calculating wave aberrations of the eye, using said  
digital signals; and

a surgical device connected to receive the calculated wave aberrations from said  
digital data processor for performing surgery of said living eye.

2  
27. The apparatus of claim 26, wherein the surgical device comprises a laser for  
performing refractive surgery of the living eye.

3  
28. The apparatus of claim 27, wherein the calculated wave aberrations comprise at  
least third order aberrations.

4  
29. The apparatus of claim 27, wherein the calculated wave aberrations comprise at  
least fifth order aberrations.

5  
30. The apparatus of claim 27, wherein the refractive surgery is performed on a  
cornea of the living eye.

6  
31. The apparatus of claim 26, wherein the surgical device comprises a laser for  
performing photoablative surgery of said living eye.

7 <sup>6</sup>  
~~32.~~ The apparatus of claim ~~31~~, wherein the calculated wave aberrations comprise at least third order aberrations.

8 <sup>6</sup>  
~~33.~~ The apparatus of claim ~~31~~, wherein the calculated wave aberrations comprise at least fifth order aberrations.

9 <sup>6</sup>  
~~34.~~ The apparatus of claim ~~31~~, wherein the photoablative surgery is performed on at least one of a cornea and a retina of the living eye.

10 <sup>1</sup>  
~~35.~~ The apparatus of claim ~~26~~, wherein the surgical device comprises a laser for performing photorefractive keratectomy (PRK).

11 <sup>10</sup>  
~~36.~~ The apparatus of claim ~~35~~, wherein the calculated wave aberrations comprise at least third order aberrations.

12 <sup>10</sup>  
~~37.~~ The apparatus of claim ~~35~~, wherein the calculated wave aberrations comprise at least fifth order aberrations.

13 <sup>1</sup>  
~~38.~~ The apparatus of claim ~~26~~, wherein the surgery comprises surgery on at least one of a cornea, a lens, a retina, a layer behind the retina and a ciliary body of the living eye.

14 ~~39~~<sup>13</sup> The apparatus of claim ~~38~~, wherein the calculated wave aberrations comprise at least third order wave aberrations.

~~15~~<sup>13</sup> ~~40~~ The apparatus of claim ~~38~~, wherein the calculated wave aberrations comprise at least fifth order wave aberrations.

16 ~~41~~<sup>1</sup> The apparatus of claim ~~26~~, wherein the calculated wave aberrations comprise at least third order wave aberrations.

17 ~~42~~<sup>1</sup> The apparatus of claim ~~26~~, wherein the calculated wave aberrations comprise at least fifth order wave aberrations.

18 ~~43~~<sup>1</sup> The apparatus of claim ~~26~~, wherein the light source comprises a laser.

19 ~~44~~<sup>1</sup> The apparatus of claim ~~26~~, wherein the optical detector comprises a Hartmann-Shack detector.

20 ~~45~~ Apparatus for use in producing a lens to correct for aberrations of a living eye, comprising:  
a light source for generating a reflected point source image of the retina of said living eye;

22

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an optical detector for receiving said reflected point source image and for  
converting said point source image to corresponding digital signals;

a digital data processor for calculating wave aberrations of the eye, using said  
digital signals; and

a lens fabricating device connected to receive the calculated wave aberrations  
from said digital data processor for fabricating said lens to correct the wave aberrations of the  
eye.

21  
46. The apparatus of claim <sup>20</sup>~~45~~, wherein the calculated wave aberrations comprise at  
least third order wave aberrations.

22  
47. The apparatus of claim <sup>20</sup>~~45~~, wherein the calculated wave aberrations comprise at  
least fifth order wave aberrations.

23  
48. The apparatus of claim <sup>20</sup>~~45~~, wherein the lens fabricating device comprises a device  
for fabricating an intraocular lens.

24  
49. The apparatus of claim <sup>20</sup>~~45~~, wherein the lens fabricating device comprises a device  
for fabricating a contact lens.